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EXAMINER	
AMIN, JWALANT B	
ART UNIT	**PAPER NUMBER**
2628	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/804,434	MORETON ET AL.	
	Examiner	Art Unit	
	JWALANT AMIN	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 5-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 2/2/2009 have been fully considered but they are not persuasive.

2. Regarding claims 1-3, 5-15, and 18-19, the applicant argues the rejection under USC 101. The applicant argues ".... by virtue of claimed 'performing', applicant clearly teaches and claims a 'transformation' of an article or physical object to a different state or thing" (see pg. 2-3).

3. However, the examiner interprets that claims 1-3, 5-15 and 18-19 are directed to a mathematical procedure, which is an abstract idea that do not correspond to any specific real world data. A person can perform the mathematical operation as claimed, using a pen and a paper, without the use of any machine. A machine is not required in performing of any of the steps of the claims, and therefore is neither an explicitly recited structural tie nor inherently involved in the step. Therefore, the claims are not properly tied. Therefore, the rejection under USC 101 is valid.

4. Regarding claims 1, 16 and 17, the applicant argues "... Aleksic discloses the bump-shading component is combined with the normal shading component, which does not suggest that the normal shading component of Aleksic is the same as the angular tilts of Cosman" (see pg. 3-6). The applicant further argues that Aleksic, Cosman and Salomon fails to teach "... wherein the modifying is based on a depth-component of the algorithm" (see pg. 3-4, 6, 8).

5. However, the examiner interprets that Aleksic teaches modifying a value (x) (N summed with ΔN produces a resulting vector N + ΔN, which is perpendicular to the bumped surface) based on an algorithm (addition corresponds to algorithm), wherein modifying is based on the normal shading component (col. 1 lines 52-57, col. 3 lines 4-6, col. col. 4 lines 1-35, col. 6 lines 25-32, col. 10 lines 2-19; it should be noted that normal shading component is a product of a normal vector of a object and a light vector; when vector N + ΔN is multiplied with the light vector L, it results in the desired shading function for this the particular pixel location and thus determine bump mapping pixel-by-pixel; the display value of a pixel is thus determined using the bump-shading component and a normal shading component, which includes a normal vector).

Although Aleksic teaches the claimed limitations as stated above, Aleksic does not explicitly teach normal vector is related to the depth-component. However, Cosman teaches to calculate angular tilts U and V from the values in height map and stored in bump angle memory (col. 1 lines 55-57, col. 6 lines 15-50; it should be noted that the angular tilts values U and V as taught by Cosman are used to calculate the bump curvature values; it should be specifically noted it that the examiner interprets that the angular tilt of the bump map is considered as functional equivalent to the normal vector as both the angular tilt and the normal vector depends on the curvature of the bump map; it should be noted that the Cosman reference deals with a three-dimensional image (see col. 4 lines 34-36); also it should be noted that both the references of Aleksic and Cosman are analogous art as they teach bump-maps; height map is the functional equivalent of a depth map; values of height map corresponds to the depth

value; it should be noted that the texel tilt values are generated using a height map (col. 6 lines 40-41); lines 30-33 of Cosman teach bump U and V values, and further teaches that each of the curvature values are derived from the bump values at each associated MIP level of detail; it should be noted that bump U and V values are same as bump values used to derive the curvature values); therefore, Cosman teaches to derive the normal vector from the depth map (depth-component), and Aleksic already teaches that modifying is based on the normal vector). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to calculate the angular tilts from the height map as taught by Cosman and apply it into the method Aleksic because by applying the local tilt to the surface normal of a bump texture map helps to crease illusions of bumps (col. 1 lines 55-57).

Although Aleksic and Cosman teach the claimed limitations as stated above, they do not explicitly teach that the normal vector of a bump map depends on it's curvature. However, Salomon teaches exactly the same (pg. 555; the derivatives of the unit normal vector depend on the curvature of the surface). Therefore, it would have been obvious to one of ordinary skill in the art to apply the known knowledge of Salomon to the combination of Aleksic and Cosman to yield predictable results.

6. Regarding claims 1, 16 and 17, the applicant further argues requests a specific showing of the subject matter for any Office Notice (see pg. 6-7).

7. However, the examiner requests the applicant to review the last office-action mailed on 10/01/2008 as all the Official Notice used by the examiner were replaced by introducing the reference of Salomon (see rejection of claim 1).

8. Regarding claims 1, 16 and 17, the applicant further argues that Cosman fails to teach "... the angular tilts values U and V ... are used to calculate the bump curvature values" (see pg. 6-8).

9. However, the examiner interprets that Cosman teaches this limitation. Cosman teaches to calculate angular tilts U and V from the values in height map and stored in bump angle memory (col. 1 lines 55-57, col. 6 lines 15-50; it should be noted that the angular tilts values U and V as taught by Cosman are used to calculate the bump curvature values; it should be specifically noted it that the examiner interprets that the angular tilt of the bump map is considered as functional equivalent to the normal vector as both the angular tilt and the normal vector depends on the curvature of the bump map; lines 30-33 of Cosman teach bump U and V values, and further teaches that each of the curvature values are derived from the bump values at each associated MIP level of detail; it should be noted that bump U and V values are same as bump values used to derive the curvature values).

10. Regarding claim 5, the applicant argues that Aleksic, Cosman and Salomon do not teach "... modifying allows a lighting operation to display an interaction of displayed objects" (see pg. 9-12). The applicant further argues "...merely disclosing that a complementary computation is needed to raise the brightness of a scene to an overall average brightness, where modification values to increase the brightness of areas surrounding the highlight depend on the nature of the bump map, in addition to disclosing a wave bump map as well as the tuning of coefficients where the bumps exist, fails to even suggest the modifying allows a lighting operation to display an

interaction of displayed objects" (see pg. 9-12). The applicant further argues Cosman does not teach "... a wave bump map displayed on a simulated ocean generates an interaction between the displayed objects, wave bump map and the ocean" (see pg. 9-12).

11. However, the examiner interprets that Aleksic, in view of Cosman teaches to tune the modification values stored with a polygon to achieve correct brightness of the ocean within the specular area (col. 1 lines 55-57, col. 6 lines 15-67, col. 9 lines 6-15 and lines 35-67, col. 10 lines 1-54; it should be noted that the angular tilts values U and V as taught by Cosman are used to calculate the bump curvature values; it should be noted that the texel tilt values are generated using a height map (col. 6 lines 40-41); lines 30-33 of Cosman teach bump U and V values, and further teaches that each of the curvature values are derived from the bump values at each associated MIP level of detail; it should be noted that bump U and V values are same as bump values used to derive the curvature values; it should be specifically noted it that the examiner interprets that the angular tilt of the bump map is considered as functional equivalent to the normal vector as both the angular tilt and the normal vector depends on the curvature of the bump map; height map is the functional equivalent of a depth map; it should be noted that the Cosman reference deals with a three-dimensional image (see col. 4 lines 34-36); also it should be noted that both the references of Aleksic and Cosman are analogous art as they teach bump-maps; therefore, Cosman teaches to derive the normal vector from the depth map (depth-component), and Aleksic already teaches that modifying is based on the normal vector; it should be noted that wave bump map and

ocean corresponds to displayed objects; it should also be noted that wave bump map displayed on a simulated ocean generates an interaction between the displayed objects, wave bump map and the ocean, to cause an animation effect; therefore it is reasonable to assume that the wave bump map and the ocean correspond to the interactive of displayed objects; it should be noted that raising the brightness of the scene to overall average brightness to compensate for the brightness decrease in areas near the specular highlight is functional equivalent of a lighting operation; when the brightness value of the scene is changed, it affects the lighting of the scene as displayed to a viewer; it should be noted that the actual modification values stored within a polygon to increase the brightness of areas surrounding the highlight will depend on the nature of the bump map). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to allow lighting operation display interaction between displayed objects as taught by Cosman and apply it into the method Aleksic because such a method helps to decrease the brightness of the specular highlights in a well behaved way to control the highlight aliasing (col. 3 lines 25-27).

Although Aleksic and Cosman teach the claimed limitations as stated above, they do not explicitly teach that the normal vector of a bump map depends on it’s curvature. However, Salomon teaches exactly the same (pg. 555; the derivatives of the unit normal vector depend on the curvature of the surface). Therefore, it would have been obvious to one of ordinary skill in the art to apply the known knowledge of Salomon to the combination of Aleksic and Cosman to yield predictable results.

12. Regarding claims 12-14 and 15, the applicant argues that Aleksic, Cosman, Demmers and Jenkins do not teach "... wherein y equals three, and wherein y equals four, especially where X includes (n * Tproj[y]), where Tproj[y] includes the projection transform" (see pg. 13-15).

13. However, the examiner interprets that Aleksic, Cosman and Salomon, in view of Demers teach to transform incoming texture coordinates, geometry or normals pertaining to a surface in object space into projected texture coordinates in homogeneous eye space (col. 8 lines 10-24, col. 9 lines 12-61; matrix transformation producing projected texture coordinates corresponds to projection transformation of the incoming texture coordinates or normals; normals [Nx, Ny, Nz] corresponds to vector; the dot product calculation between the normals and the matrix corresponds to (n*Tproj[y]), which further implies that X includes the dot product calculation between the normals and the matrix; it should be noted although the reference does not use same terminology as the claimed invention, the functional equivalents of the related terms has been suggested by the examiner; the language of the claims do not suggest that claimed invention cannot be a case of viewpoint motion with a constant view direction vector and a transform of x and y object-space values). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to produce projected texture coordinates in homogeneous (eye) space using matrix transformation as taught by Demers into the system of Aleksic, Cosman and Salomon because matrix transformation could be used for any type of texturing dependent on the

geometry of the object (e.g. environment mapping, reflection mapping, etc) (col. 10 lines 65-67 and col. 11 lines 1-5).

Although the combination of Aleksic, Cosman and Demers teach all of the claimed limitations as stated above, they do not explicitly teach y equals three and y equals four. However, Jenkins teaches a case when viewpoint motion vector is parallel to view direction vector, object space x and y values are constant while z value varies (col. 53 lines 56-67, col. 54 lines 38; constant y corresponds to y=3 or y=4; it should be noted that by y = 3 and y = 4, the examiner interprets the value of y stays constant during the transformation process). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to use constant values of y as taught by Jenkins into the system of Aleksic, Cosman, Salomon and Demers because these method gives exact results requiring fewer floating point operations than the floating point operations required for multiplication of a vector [x y z] by a general transformation matrix, and reduce the cost of transformation-projection (col. 54 lines 20-23 and lines 29-34).

Claim Rejections - 35 USC § 101

14. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

15. Claims 1-3, 5-15 and 18-19 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

16. Claim(s) 1-3, 5-15 and 18-19 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. While the claims recite a series of steps or acts to be performed, a statutory "process" under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. The instant claims neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process.

17. Regarding claim 1, the steps of the claim are directed to a mathematical procedure, which is an abstract idea that does not correspond to any specific real world data. A person can perform the mathematical operation as claimed, using a pen and a paper, without the use of any machine. A machine is not required in performing of any of the steps of the claim, and therefore is neither an explicitly recited structural tie nor inherently involved in the step. Therefore, the claim is not properly tied.

18. Regarding claims 2-3, 5-15 and 18-19, the examiner gives the same reasons as stated above.

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

20. Claims 1-3, 5-6, 8, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic et al. (US 6,175,368; hereinafter referred to as Aleksic), in view of Cosman (US 6525740), and further in view of Salomon ("Computer Graphics and Geometric modeling").

21. Regarding claims 1, 16 and 17, Aleksic teaches modifying a value (x) (N summed with ΔN produces a resulting vector N + ΔN, which is perpendicular to the bumped surface) based on an algorithm (addition corresponds to algorithm), wherein modifying is based on the normal shading component (col. 1 lines 52-57, col. 3 lines 4-6, col. col. 4 lines 1-35, col. 6 lines 25-32, col. 10 lines 2-19; it should be noted that normal shading component is a product of a normal vector of a object and a light vector; when vector N + ΔN is multiplied with the light vector L, it results in the desired shading function for this the particular pixel location and thus determine bump mapping pixel-by-pixel; the display value of a pixel is thus determined using the bump-shading component and a normal shading component, which includes a normal vector).

Although Aleksic teaches the claimed limitations as stated above, Aleksic does not explicitly teach normal vector is related to the depth-component. However, Cosman teaches to calculate angular tilts U and V from the values in height map and stored in bump angle memory (col. 1 lines 55-57, col. 6 lines 15-50; it should be noted that the angular tilts values U and V as taught by Cosman are used to calculate the bump curvature values; it should be specifically noted it that the examiner interprets that the angular tilt of the bump map is considered as functional equivalent to the normal vector as both the angular tilt and the normal vector depends on the curvature of the bump

map; it should be noted that the Cosman reference deals with a three-dimensional image (see col. 4 lines 34-36); also it should be noted that both the references of Aleksic and Cosman are analogous art as they teach bump-maps; height map is the functional equivalent of a depth map; values of height map corresponds to the depth value; it should be noted that the texel tilt values are generated using a height map (col. 6 lines 40-41); lines 30-33 of Cosman teach bump U and V values, and further teaches that each of the curvature values are derived from the bump values at each associated MIP level of detail; it should be noted that bump U and V values are same as bump values used to derive the curvature values); therefore, Cosman teaches to derive the normal vector from the depth map (depth-component), and Aleksic already teaches that modifying is based on the normal vector). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to calculate the angular tilts from the height map as taught by Cosman and apply it into the method Aleksic because by applying the local tilt to the surface normal of a bump texture map helps to crease illusions of bumps (col. 1 lines 55-57).

Although Aleksic and Cosman teach the claimed limitations as stated above, they do not explicitly teach that the normal vector of a bump map depends on it's curvature. However, Salomon teaches exactly the same (pg. 555; the derivatives of the unit normal vector depend on the curvature of the surface). Therefore, it would have been obvious to one of ordinary skill in the art to apply the known knowledge of Salomon to the combination of Aleksic and Cosman to yield predictable results.

22. Regarding claim 2, Aleksic teaches the pixel data includes a normal value (vector N corresponds to the normal value), and further comprising modifying the normal value ($N + \Delta N$; col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67).

23. Regarding claim 3, Aleksic teaches the operation includes a lighting operation (performing a dot product of $N + \Delta N$ with light vector L produces shadowing function for the particular pixel location; this operation corresponds to lighting operation; col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67).

24. Regarding claim 5, Aleksic (Fig. 1, Fig. 6, col. 3 lines 62-67, col. 4 lines 1-35, col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67) teaches a method and an apparatus (Fig. 1) for modifying a value (x) (N summed with ΔN) based on an algorithm (addition corresponds to algorithm); and performing an operation (dot product with light vector corresponds to the operation performed on the resulting/modified value) on pixel data taking into account the modified value ($N + \Delta N$); wherein the value (N) is modified utilizing the equation: $x + \Delta (X)$, where Δ includes a value read from a texture map ($N + \Delta N$ corresponds to $x + \Delta (X)$; ΔN is obtained by using the coefficient B_u and B_v determined by utilizing the bumb map coordinates to access the bump map, which may be a texture map). Aleksic teaches modifying is based on the normal shading component (col. 3 lines 4-6).

Although Aleksic teaches the claimed limitations as stated above, Aleksic does not explicitly teach modifying allows a lighting operation to display an interaction of displayed objects. However, Cosman teaches to tune the modification values stored with a polygon to achieve correct brightness of the ocean within the specular area (col.

1 lines 55-57, col. 6 lines 15-67, col. 9 lines 6-15 and lines 35-67, col. 10 lines 1-54; it should be noted that the angular tilts values U and V as taught by Cosman are used to calculate the bump curvature values; it should be noted that the texel tilt values are generated using a height map (col. 6 lines 40-41); lines 30-33 of Cosman teach bump U and V values, and further teaches that each of the curvature values are derived from the bump values at each associated MIP level of detail; it should be noted that bump U and V values are same as bump values used to derive the curvature values; it should be specifically noted it that the examiner interprets that the angular tilt of the bump map is considered as functional equivalent to the normal vector as both the angular tilt and the normal vector depends on the curvature of the bump map; height map is the functional equivalent of a depth map; it should be noted that the Cosman reference deals with a three-dimensional image (see col. 4 lines 34-36); also it should be noted that both the references of Aleksic and Cosman are analogous art as they teach bump-maps; therefore, Cosman teaches to derive the normal vector from the depth map (depth-component), and Aleksic already teaches that modifying is based on the normal vector; it should be noted that wave bump map and ocean corresponds to displayed objects; it should also be noted that wave bump map displayed on a simulated ocean generates an interaction between the displayed objects, wave bump map and the ocean, to cause an animation effect; therefore it is reasonable to assume that the wave bump map and the ocean correspond to the interactive of displayed objects; it should be noted that raising the brightness of the scene to overall average brightness to compensate for the brightness decrease in areas near the specular highlight is functional equivalent of a

lighting operation; when the brightness value of the scene is changed, it affects the lighting of the scene as displayed to a viewer; it should be noted that the actual modification values stored within a polygon to increase the brightness of areas surrounding the highlight will depend on the nature of the bump map). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to allow lighting operation display interaction between displayed objects as taught by Cosman and apply it into the method Aleksic because such a method helps to decrease the brightness of the specular highlights in a well behaved way to control the highlight aliasing (col. 3 lines 25-27).

Although Aleksic and Cosman teach the claimed limitations as stated above, they do not explicitly teach that the normal vector of a bump map depends on it's curvature. However, Salomon teaches exactly the same (pg. 555; the derivatives of the unit normal vector depend on the curvature of the surface). Therefore, it would have been obvious to one of ordinary skill in the art to apply the known knowledge of Salomon to the combination of Aleksic and Cosman to yield predictable results.

25. Regarding claim 6, Aleksic teaches the modifying allows the lighting operation to display bumpy shadows (dot product of light vector with N + ΔN produces a bump shadowing function for the particular pixel; this resulting shadow function is combined with rendered pixel data to produce the resultant display data for the given pixel; this display data displays bumpy shadows; Fig. 6, col. 3 lines 4-9, col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67).

26. Regarding claim 8, Aleksic teaches the operation includes a shadow mapping operation (desired shadow function; col. 10 lines 8-19).

27. Claims 7 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic, Cosman and Salomon, and further in view of Leather et al. (US 6,664,958; hereinafter Leather), and further in view of Foran et al. (US 5742749, hereinafter Foran).

28. Regarding claims 7 and 9-11, although Aleksic, Cosman and Salomon teaches all of the claimed limitations as stated above, they do not explicitly teach the operation includes a hidden surface calculation and that the value includes a depth-value, a clip-space z-value and a clip-space w-value. However, Leather teaches to apply the pixel depth values resulting from the z blending operation to a hidden surface removal operation (col. 9 lines 55-67 and col. 10 lines 1-5; hidden surface removal operation corresponds to operation includes a hidden surface calculation; col. 9 lines 29-32, depth (z) corresponds to clip-space z-value). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to use the hidden surface removal operation of Leather and apply it into the system of Aleksic, Cosman and Salomon because using hidden surface removal operation in conjunction with the z buffer allows the z texture to control whether parts of the texture mapped image are occluded by other objects in the scene (col. 10 lines 3-5).

Although Aleksic, Cosman, Salomon and Leather teach the limitations as stated above, they do explicitly teach that depth coordinate z is same as w. However, Foran (col. 6 lines 64-66) teaches that the depth coordinate z is known as w, when iteration of

a coordinate for a non-projected texture takes place in the viewer's coordinate system. Therefore, it would have been obvious to one of ordinary skill in the art at the time of present invention to apply the known knowledge of Foran to the combination of Aleksic, Cosman, Salomon and Leather to yield predictable results.

29. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic, Cosman and Salomon, and further in view of Demers et al. (US 6,700,586; hereinafter Demers).

30. Regarding claims 12 and 13, although Aleksic, Cosman and Salomon teaches all of the claimed limitations as stated above, they do not explicitly teach that X involves a projection transform, and X includes ($n * T_{proj}[y]$), where $T_{proj}[y]$ includes the projection transform, n includes a vector. However, Demers teach to transform incoming texture coordinates, geometry or normals pertaining to a surface in object space into projected texture coordinates in homogeneous eye space (col. 8 lines 10-24, col. 9 lines 12-61; matrix transformation producing projected texture coordinates corresponds to projection transformation of the incoming texture coordinates or normals; normals [Nx, Ny, Nz] corresponds to vector; the dot product calculation between the normals and the matrix corresponds to (n*Tproj[y]), which further implies that X includes the dot product calculation between the normals and the matrix; it should be noted although the reference does not use same terminology as the claimed invention, the functional equivalents of the related terms has been suggested by the examiner). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to

produce projected texture coordinates in homogeneous (eye) space using matrix transformation as taught by Demers into the system of Aleksic, Cosman and Salomon because matrix transformation could be used for any type of texturing dependent on the geometry of the object (e.g. environment mapping, reflection mapping, etc) (col. 10 lines 65-67 and col. 11 lines 1-5).

31. Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic, Cosman, Salomon and Demers, and further in view of Jenkins (US 6,028,608).

32. Regarding claims 14 and 15, although the combination of of Aleksic, Cosman, Salomon and Demers teach all of the claimed limitations as stated above, they do not explicitly teach y equals three and y equals four. However, Jenkins teaches a case when viewpoint motion vector is parallel to view direction vector, object space x and y values are constant while z value varies (col. 53 lines 56-67, col. 54 lines 38; constant y corresponds to y=3 or y=4; it should be noted that by y = 3 and y = 4, the examiner interprets the value of y stays constant during the transformation process). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to use constant values of y as taught by Jenkins into the system of Aleksic, Cosman, Salomon and Demers because these method gives exact results requiring fewer floating point operations than the floating point operations required for multiplication of a vector [x y z] by a general transformation matrix, and reduce the cost of transformation-projection (col. 54 lines 20-23 and lines 29-34).

33. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic, Cosman, Salomon, Leather, and Foran and further in view of Akeley et al. (US 5819017; hereinafter Akeley).

34. Regarding claims 18 and 19, the statements presented above with respect to claims 10 and 11, are incorporated herein.

Although the combination of Aleksic, Cosman, Salomon and Leather teach the limitations as stated above, they do not explicitly teach the clip-space z-value and w-value is extracted using a projection transform. However, Akeley teaches that the Z values (clip-space z-value) associated with the primitives are transformed according to standard projection division (projection transform) algorithms (col. 5 lines 29-31). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to transform z values according to projection as taught by Akeley and use it into the method of Aleksic, Cosman, Salomon and Leather because transforming z values associated with the primitives according to projection division algorithm gives an object the perception of depth (col. 5 lines 29-32).

Conclusion

35. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JWALANT AMIN whose telephone number is (571)272-2455. The examiner can normally be reached on 10:30 a.m. - 7:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kee Tung can be reached on 571-272-7794. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kee M Tung/
Supervisory Patent Examiner, Art Unit 2628

/J. A./
Examiner, Art Unit 2628